

A fourth track, see fig. 1, 4, passed through Franklin County, the tornado striking Decherd about 12:30 a. m., April 30, and apparently passing, with diminished violence, through Grundy and Meigs counties. Its track was about 2 miles wide at Decherd.

Each of these terrific disturbances was accompanied by the usual distinctive marks of the tornado—pendant funnel-shaped cloud, narrow path, destructive violence and scattering of debris in all directions.

Deaths were reported as follows: Giles County, 22; Lincoln County, 7; Williamson County, 8; Montgomery County, 4; Chester County, 4; Hickman County, 10; Franklin County, 4; Hardeman County, 1. The list is not complete for the State. A hundred or more people were reported injured, a number fatally. The property loss was estimated as follows: Giles County, \$100,000; Lincoln County, \$100,000; Montgomery County, about \$25,000; Williamson County, \$100,000; Chester County, about \$15,000; Shelby County, about \$150,000; Hickman County, \$150,000; Algood and vicinity, about \$10,000; Decherd and vicinity, about \$150,000; Bolivar and vicinity, about \$5,000. The losses are not all reported, and the amounts given are only approximately correct.—*H. C. Bate.*

TORNADOES IN MISSISSIPPI.

By W. S. BELDEN, Section Director.

On the evening of April 6 a tornado passed through the suburbs of Aberdeen, Miss., killing five persons, seriously injuring several others, and destroying considerable property.

At about 7:30 p. m. April 29 a tornado approximately one-half mile in width and moving in an easterly direction passed through the villages of Horn Lake and Plumpoint, which are located in the extreme northern portion of De Soto County, Miss. Six persons were killed by the storm, four or five injured, and the loss of property was heavy. This storm also did considerable damage in Tennessee.

SEVERE LOCAL STORM AT CLEVELAND, OHIO.

By JAMES KENEALY, Local Forecaster. Dated Cleveland, Ohio, May 22, 1909.

On the morning of April 21 the daily weather map showed a deep cyclonic trough extending from the Texas coast to Lake Superior, with the disturbance central near Springfield, Ill., where the barometer then stood at 29.40 inches. At 7 p. m. of that day the telegraphic reports showed the axis of the barometric trough to have advanced to a north-south line extending through Lakes Huron and Erie and the upper Ohio Valley, with the center of the depression located near Saugeen, Ontario, from which station a barometric reading of 29.24 inches was reported. The local storm at Cleveland occurred between noon and 1 p. m., in the southeast quadrant of the cyclone whose center was then passing northeastward near the southern border of Michigan. At Cleveland the day began with cloudy and threatening weather, light winds from the east, with the temperature stationary at 43° during the hours from midnight to 4 a. m., the morning minimum. The barometer fell slowly during the hours from midnight to 7 a. m., and the barograph showed a few slight oscillations in the pressure during that period. At 7 a. m. the temperature had risen to 46° and the wind had veered to southeast, increasing to a velocity of 20 miles per hour, with gradually diminishing pressure. Light rain began at 7:05 a. m. and ended at 9:30 a. m., the shower giving a total rainfall of 0.14 inch. A few rumbles of thunder were heard in the northeast about the time the shower ended. By 8 a. m. the temperature was beginning to rise quite rapidly, with fast diminishing pressure. The southeast wind steadily increased and a squall between 10 and 11 a. m. attained a velocity of 42 miles per hour for five minutes. From this time till noon the wind gradually decreased to moderate, with generally cloudy weather, though a few minutes of sunshine had followed the shower. The temperature

had risen from 43° at 4 a. m. to 51° at 9 a. m., reaching 68° at noon, its maximum for the day, while the barometer had fallen from 28.97 inches to 28.59 inches during the same interval.

At 12:25 p. m. a threatening cloud appeared in the southwest; at 12:30 p. m. there were a few vivid flashes of zigzag lightning and moderately heavy thunder in the west, and the sky darkened rapidly; at 12:31–12:34 the wind veered suddenly to southwest and west and, with a squall of hurricane force, came a very abrupt increase in pressure, rapidly falling temperature, a heavy downpour of rain, and some hail. The barometer rose 0.15 inch in about twenty minutes and the temperature fell from 68° to 46° in the same period of time. The fall of hail lasted about a minute, the hailstones were about the size of peas, and the precipitation from hail melted was estimated as 0.01 inch. As is common during the climax of severe thunderstorms, the darkness at this time was intense, and it continued so for three or four minutes. The wind reached its greatest violence during the three minutes that it was from the west, 12:31 to 12:34 p. m., and no doubt the greatest damage was done by this west wind. It blew at the rate of 72 miles per hour during the minute from 12:32 to 12:33 and 84 miles per hour during the minute from 12:33 to 12:34 p. m. The maximum 5-minute rate was 66 miles per hour, from 12:31 to 12:37 p. m. For the nine minutes, 12:31 to 12:40 p. m. the wind blew at the rate of 40 miles, or more, per hour. After this time the temperature and pressure conditions returned rapidly to those appropriate for their location with reference to the center of the cyclone, and the rain, which had begun at 12:22 p. m., finally ended at 2:14 p. m., with a total registered precipitation of 0.20 inch, most of which fell during the time of the squalls. The last thunder was heard in the northeast at 1:02 p. m. From 1 to 3 p. m. the winds were from southwest to south, brisk to moderate in force; by 2 p. m. the temperature had risen to 59°, and by 5 p. m. it had risen to 66°, with sunshiny weather. Later in the day moderate to brisk southwest winds veered to west, with a change to cooler, and the minimum temperature of the day, 42°, occurred at midnight, following the passage of the large cyclonic area to the northeastward.

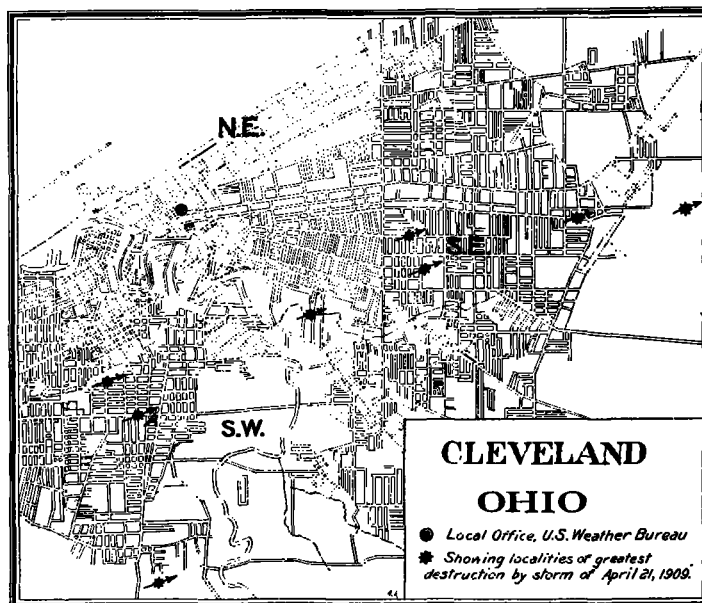


FIG. 1.—Path of storm through Cleveland, Ohio, April 21, 1909.

Casualties and damage to property.—Considering the number of persons killed and injured and the damage to property, the storm was the most disastrous that the city has ever suffered. Seven persons were killed by flying debris, collapsing build-

ings, or being blown from their foothold; but one was so terrified that he committed suicide. About 50 other persons were badly injured and two were struck by lightning. The damages amount to a total estimated loss of \$1,000,000, of which \$500,000 was principally sustained by a few large manufacturing establishments, twelve churches and seventeen schoolhouses, nearly all of which were located in the southeast or the southwest sections of the city. The railway and telephone lines operating in these sections were also heavy losers by injuries to their property. The northeast and northwest sections of the city suffered only small losses through damage to property, but even in these sections some roofs of buildings were injured and windows broken, and at A, fig. 1, "every telephone and trolley post on the west side of the street for 8 blocks was either blown down or badly damaged."

Reports received by the local newspapers showed that on the day of this storm considerable damage was done by thunderstorms in the adjacent county (Lorraine) on the west and at places in the belt of counties extending thence northeast to Ashtabula County. At Elyria, according to a report, "Windows were blown in and outbuildings and sheds wrecked." At Medina, "Trees in the public square were uprooted, telegraph poles were blown down and roofs and chimneys wrecked." At Ashtabula, "One house was turned completely upside down and demolished. The roof of the Lyceum Theater was carried over residences and shot through North Park, trees being stripped in its path;" also, "A house was blown from its foundation, barns and small buildings all over the city were unroofed and completely razed." In Plymouth, Ashtabula County, "A man who sought shelter in a horse shed during a thunderstorm was killed by the collapse of a church near by, and another man who had sought shelter in the same shed was knocked senseless, and one of his arms was broken."

It seems probable that if the hours of occurrence of these disturbances, and others on the same day in northern Ohio, could be learned the facts might show that the Cleveland storm originated in one of the counties of northwestern Ohio and traveled thence through this city into Ashtabula County. However, it would probably be impossible to trace the connection between these local storms, owing to the lack of reliable observations of time, barometric readings, and other essential data.

It is believed that the Cleveland storm should properly be classed as an exceptionally severe local storm, but not as a tornado. So far as can be learned, no one saw the funnel-shaped tornado cloud when this storm was advancing or after it had passed. There were but few flashes of lightning. Objects, such as trees or poles that had been overturned by the wind, were found to lie in a direction from southwest to northeast, or west to east, and in the majority of cases they lay toward the east. In a few instances heavy roofing of tin or other material had been carried from one roof to another 100 to 200 feet distant, and they were carried from west to east. In the grove near the Euclid Club, where about 100 trees, large and small, were found uprooted and blown over within an area not larger than four acres, the trunks lay as if overturned by a southwest or west wind. Near the same club house an iron flagstaff, 4 inches in diameter, had been blown nearly prostrate in a northeastward direction, the wind having bent the iron near the base of the staff. Among all the hundreds of houses where panes of window glass were broken out, there seems to have been no breaking by outward expansion of the air, though there were windows fronting east that had their glass broken and forced outward, this effect being probably due to the west squall having reached them through open doors or windows in the rear of the house. So far as can be learned no chickens were stripped of their feathers, nor were any trees stripped of their bark. For these

reasons, and notwithstanding the great destructive force that the wind attained at many places within a zone of 1 to 2 miles in width and 6 miles long within the city and its outskirts, it seems proper to assume that the storm was not a tornado.

TORNADO IN ALABAMA.

By E. C. HORTON, Assistant Observer. Dated: Montgomery, Ala., May 21, 1909.

I have the honor to submit the following report of a tornado that occurred in the northern part of Alabama near midday of April 30, 1909.

The storm began about 7 miles southeast of Moulton, Lawrence County, and moved in a northeasterly direction to about $1\frac{1}{2}$ miles north of Danville, Morgan County, where it seems to have disappeared.

The storm track varied from 100 yards to a half mile in width. The tornado was well defined, having the characteristic funnel-shaped cloud, with the usual destructive effects. At Madison it seems to have been represented by a severe hailstorm. Only one person was killed, but about eighteen were more or less injured. Seven dwellings were demolished, their value being estimated at \$4,000. The damage to timber and other property was also great, and the loss in livestock was considerable. It would probably be conservative to place the entire property loss at not less than \$15,000.

TORNADOES IN ARKANSAS.

[Extract from the Monthly Climatological Summary, Arkansas Section, March, 1909.]

February, 1909.

At 8 a. m., seventy-fifth meridian time, February 5, 1909, a low of large geographic extent and great intensity extended from the Lake region to Texas, the center of the storm being over Davenport, Iowa, with a pressure of 29.24 inches. At that hour Arkansas was in the southeast quadrant of the storm and the weather, which was abnormally warm, damp, and blustery, with thunderstorms at many places, was favorable for the development of tornadoes.

Between 8 and 9:30 o'clock in the morning tornadoes passed over Hamburg, Ashley County, and Stuttgart, Arkansas County. At Hamburg there was no loss of life and no one was injured, but two brick buildings were damaged, the loss in buildings and merchandise being estimated at \$6,000. The tornado that passed over Stuttgart killed two persons and injured several others, and two residences and six barns were destroyed. At Little Rock, Pulaski County, a thunderstorm, accompanied by rain, hail, and high wind, prevailed from 7:02 to 9:30 a. m., a maximum velocity of 52 miles per hour from the northwest being recorded at 7:12 a. m. No damage resulted in the city from this storm.

During the early morning of February 23, 1909, a destructive tornado passed over portions of Lonoke, Prairie, Woodruff, Jackson, and Poinsett counties. The weather map of February 22 showed a storm of great intensity central over Colorado, while a secondary disturbance overlaid southwestern Texas. These storms, following their usual paths, had moved during the next 24 hours to western Missouri and central Arkansas, respectively.

In Arkansas the weather was cloudy, the temperature much above the normal, and the barometer falling rapidly. The conditions were generally favorable for the development of tornadoes. The storm appeared at Little Rock about 11:30 p. m. of the 22d in the form of a heavy thunderstorm, although the wind was comparatively light. Moving northeastward, it first assumed the proportions of a tornado at McCreanor, Lonoke County, about 2 a. m. of the 23d, where the damage was about \$500 in property and 1 person was injured. About 8 miles southeast of Hickory Plains, Prairie County, the storm caused a loss of \$5,000, killed 1 person, and injured 20. The storm passed southeast of Augusta, Woodruff County, about 3